

NORTH CAROLINA DIVISION OF AIR QUALITY <h2 style="text-align: center;">Application Review</h2>			Region: Mooresville Regional Office County: Cleveland NC Facility ID: 2300397 Inspector's Name: NA Date of Last Inspection: NA Compliance Code: NA		
Facility Data Applicant (Facility's Name): AMES Copper Group - Shelby Facility Address: AMES Copper Group - Shelby 135 Old Boiling Springs Road Shelby, NC 28152 SIC: 3341 / Secondary Nonferrous Metals NAICS: 331423 / Secondary Smelting, Refining, and Alloying of Copper Facility Classification: Before: N/A After: Title V Fee Classification: Before: N/A After: Title V			Permit Applicability (this application only) SIP: 15A NCAC 02D .0515, .0516 .0521, .0535, .0540, and .1806. 15A NCAC 02Q .0207, .0304, .0504, and 0508(f). NSPS: 40 CFR Subpart 60 NSPS IIII NESHAP: 40 CFR Subpart 63 GACT FFFFFFFF and GACT ZZZZ PSD: N/A PSD Avoidance: 15A NCAC 02Q.0317 for 02D .0530 and .1111 NC Toxics: Facility is exempt per 15A NCAC 02Q .0702(a)(27) 112(r): N/A Other: N/A Note: Facility with a SIC No. of 3341 is considered to be on the list of 28 facilities with a 100 tpy PSD threshold {40 CFR 51.166(b)}.		
FIContact Data			Application Data		
Facility Contact Claude Dube President (704) 482-8200 135 Boiling Springs Road Shelby, NC 28152	Authorized Contact Bernard Schilberg CEO (860) 622-7626 99 East River Drive East Hartford, CT 06108	Technical Contact Claude Dube President (704) 482-8200 135 Boiling Springs Road Shelby, NC 28152	Application Number: 2300397.20A Date Received: 05/07/2020 Application Type: Greenfield Facility Application Schedule: State Existing Permit Data Existing Permit Number: N/A Existing Permit Issue Date: N/A Existing Permit Expiration Date: N/A		
Review Engineer: Richard Simpson Review Engineer's Signature: _____ Date: November XX, 2020			Comments / Recommendations: Issue: 10674/R00 Permit Issue Date: November XX, 2020 Permit Expiration Date: October 31, 2028		

1. Purpose of Application:

Application is made for a greenfield permit. This facility will include the production process of fired-refined copper using secondary metals as a raw material. The fire-refined copper will be cast into anodes, sold to other companies, and shipped off-site for further refining.

AMES Copper Group is partially owned by IMC Metals America, LLC, which currently operates as a registered facility under Registration No. 2300314X00. IMC operates a copper production facility and produces copper rods and plating anodes containing approximately 99.2% purity copper.

To be considered part of a single entity, the facilities must be under common legal control, located on contiguous properties, and have the same 2-digit SIC code. Both AMES and IMC have the same 2-digit SIC and will be located on contiguous property. However, AMES will operate as a stand-alone company with partial ownership with IMC. AMES will have independent staff and

leadership, operating processes, technology and P&L statements. AMES' raw material supply, end-product design, and customers will also be separate from IMC. Since all three criteria are not met, AMES submitted the application for a greenfield facility and will be issued a separate permit.

The AMES operation will produce a cast anode as the final product. The anodes will be sold to others for further refinement by electrolysis. This electrolytic refining will not be conducted at AMES. The typical charge feedstock will not be less than 90% copper on average. Therefore, the typical steps in the processing of lower grade copper, such as blast furnace or convertor, will not be required in this process. The feedstock will be a mixture of copper-bearing scrap comprised of tubing, valves, windings, wire, radiators, turnings, mill scrap, ammunition casings, and high copper containing alloys.

The secondary copper recovery process consists of scrap pretreatment, smelting, and casting. The pretreatment will include manual and mechanical methods of sorting the scrap. The lighter scrap will be compressed into bales in a hydraulic press. The scrap and bales will be loaded into the scrap charging machine to load the furnace. There will be no sweating, burning insulation from the wire, or kiln drying at this facility.

The smelting process consists of a natural gas-fired tilting refinery furnace. One cycle takes about 24 hours to complete. This cycle has the following steps: charging and melting, oxidation and deslagging, reduction, and casting.

The facility will be installing fabric filter controls for particulate emissions and a sodium bicarbonate injection system to control hydrogen chloride emissions. Since this facility will be subject to 40 CFR Subpart FFFFFF "National Emission Standards for Hazardous Air Pollutants for Secondary Copper Smelting Area Sources", it is required by regulation to obtain a Part 70 Permit (Title V) in accordance with 40 CFR 63.11153(d).

2. Application Chronology:

The application was received on May 7, 2020.

The acknowledgment letter was sent on May 18, 2020 requesting that the facility submit a complete zoning consistency determination and the application fee.

The zoning consistency was received on May 18, 2020.

The application fee was received May 19, 2020.

The facility submitted a modeling request and evaluation with the application. The memo from AQAB was dated June 10, 2020 and was received via email on June 11, 2020.

The facility submitted an applicability request to EPA on July 6, 2020 to determine if they are subject to NESHAP Subpart FFFFFF. On July 14, 2020, Marion Watson of EPA sent an email to Denise Hayes of the MRO asking how we handled the confidential information part of the application that was submitted to our office. Ms. Hayes' reply on July 14, 2020 noted that the application submitted to our office did not contain pages that were stamped confidential and it did not contain a request for information to be held confidential.

An additional information request was sent on July 14, 2020 requesting the facility submit the certification for the emergency engine. The response was received on July 22, 2020 and indicated the facility has not yet purchased the engine. The certification will be reviewed at the initial inspection of the facility.

An additional information request was sent to the facility on July 29, 2020 requesting information on the method of calculation for natural gas combustion and a toxics review. The response was received on July 31, 2020.

Additional information was also received August 5, 2020 to update emissions calculations.

The EPA Acting Director of the Air and Radiation Section, Gregg Worley, sent a response email letter to the facility signed August 14, 2020 stating the facility was subject to NESHAP Subpart FFFFFF based on their proposed operations and the regulatory definitions. Thus, the facility is classified as a Title V source per Part 70.

The MRO contacted the RCO on August 17, 2020 to notify about the new Title V facility classification and the transfer of documents.

An additional information letter was sent to the facility on August 20, 2020 requesting an additional Title V Greenfield fee of \$9,777 to continue processing the Air Quality Permit application. DAQ engineer Richard Simpson also called facility representative Jennifer Garvon concerning the letter.

A first draft of the permit was sent internally to DAQ engineers in the RCO and MRO. Comments were received and updates were made between September 2-9, 2020.

Information was given by facility representatives concerning NESHAP FFFFFF and hourly emission rates on September 9-10, 2020.

The facility, Mooresville Regional Office, and Stationary Compliance Section were requested by the Permitting Section to comment on the final draft permit and review between September 14-23, 2020. Comments were received and included in the permit.

DEQ Environmental Justice staff requested a summary. A summary was prepared, reviewed by DAQ personnel with comments. Summary and comments were addressed between October 6 – 8, 2020.

ESM changes were approved by Mrs. Jenny Sheppard ESM Coordinator on October XX, 2020.

Permit 100619R00 was signed and issued on November XX, 2020.

3. Permitted Equipment Changes:

The following equipment will be listed in the permit:

Emission Source ID	Emission Source Description	Control System ID	Control System Description
TRF-1	tilting refinery furnace for secondary copper smelting (8 tons per hour and 20.47 million Btu per hour maximum heat input) consisting of charging and melting, oxidation and deslagging, and reduction processes	BH-1, DSI-1	dry sorbent injection system (ID No. DSI-1) installed in series with fabric filter (ID No. BH-1; 48,000 square feet of filter area)
SILO-1	sodium carbonate storage silo (750 pounds per hour maximum process rate)	BVF-1	bin vent filters

4. Specific Conditions and Limitations:

The Permittee shall comply with the following Environmental Management Commission Regulations, including Title 15A North Carolina Administrative Code (NCAC).

- 02D .0515, “Particulates from Miscellaneous Industrial Processes”
- 02D .0516, “Sulfur Dioxide Emissions from Combustion Sources”
- 02D .0521, “Control of Visible Emissions”
- 02D .0524, “New Source Performance Standards” (40 CFR Part 60 Subpart IIII)
- 02D .0535, “Excess Emissions Reporting and Malfunctions”
- 02D .0540, “Particulates from Fugitive Non-Process Dust Emission Sources”
- Exempt from 02D .1100, “Control of Toxic Air Pollutants” per 2Q .0702(a)(27)
- 02D .1111, “National Emission Standards for Hazardous Air Pollutants” (40 CFR Part 63 Subpart ZZZZ)
- 02D .1111, “National Emission Standards for Hazardous Air Pollutants” (40 CFR Part 63 Subpart FFFFFF)
- 02D .1806, “Control and Prohibition of Odorous Emissions”
- 02Q .0207, “Annual Emissions Reporting”
- 02Q .0304, “Applications”
- 02Q .0317 Avoidance Conditions for 15A NCAC 02D .0530, “Prevention of Significant Deterioration”
- 02Q .0317 Avoidance Conditions for 15A NCAC 02D .1111, “Maximum Achievable Control Technology”
- 02Q .0504, “Option for Obtaining Construction and Operating Permit”
- Exempt from 02Q .0711, “Emission Rates Requiring a Permit” per 2Q .0702(a)(27)

a. 15A NCAC 02D .0515, “Particulates from Miscellaneous Industrial Processes”

Allowable Particulate Emissions (E_{allow})

$$E_{allow} = 4.10 \times (P)^{0.67} \quad \text{for } P \leq 30 \text{ ton/hr, or}$$

$$E_{allow} = 55.0 \times (P)^{0.11} - 40 \quad \text{for } P > 30 \text{ ton/hr}$$

where P = process weight rate in tons per hour

E = emission rate in pounds per hour

Tilting refinery furnace (ID No. TRF-1)

The furnace has a maximum process rate of 8 tons of scrap per hour.

$$P = 8 \text{ ton/hr}$$

$$E_{\text{allow}} = 4.10 \times (8.0)^{0.67}$$

$$E_{\text{allow}} = 16.51 \text{ lb/hr}$$

Sodium bicarbonate storage silo (ID No. SILO1)

The silo has a maximum process rate of 750 pounds per hour.

$$P = (750 \text{ lb/hr}) \times (\text{ton}/2000 \text{ lb}) = 0.38 \text{ ton/hr}$$

$$E_{\text{allow}} = 4.10 \times (0.38)^{0.67}$$

$$E_{\text{allow}} = 2.14 \text{ lb/hr}$$

Estimated Actual Particulate Emissions (E_{ac})

Tilting refinery furnace (ID No. TRF-1)

The application includes a manufacturer particulate matter emission factor of 6.35 kilogram per batch. This equates to 0.071 lb/ton. This factor includes the control for the dry sorbent system and the fabric filter.

$$EF = (6.35 \text{ kg/batch}) \times (\text{batch}/198 \text{ ton}) \times (2.20462 \text{ lb/kg}) = 0.071 \text{ lb/ton}$$

$$E_{\text{ac}} = (8 \text{ ton/hr}) \times (0.071 \text{ lb/ton}) = 0.57 \text{ lb/hr}$$

$$E_{\text{ac}} (0.57 \text{ lb/hr}) < E_{\text{allow}} (16.51 \text{ lb/hr})$$

Sodium bicarbonate storage silo (ID No. SILO1)

The uncontrolled particulate emissions factor of 5.2 lb/ton from AP-42 Table 8.21-3 is used to calculate particulate emissions from the silo. The silo is controlled with a bin vent filter with an estimated control efficiency of 99.9%. NOTE: The application states the bin vent is considered inherent control but for worst case we assume it is not inherent.

$$E_{\text{ac}} = (0.38 \text{ ton/hr}) \times (5.2 \text{ lb/ton}) \times (1 - 0.999) = 0.0020 \text{ lb/hr}$$

$$E_{\text{ac}} (0.0020 \text{ lb/hr}) < E_{\text{allow}} (2.14 \text{ lb/hr})$$

Therefore, the facility is expected to be in compliance with 02D .0515.

- b. 15A NCAC 02D .0516, "Sulfur Dioxide Emissions from Combustion Sources"

The sulfur dioxide emissions are limited to 2.3 pounds per million Btu heat input. Per an MRO memo “02D .0516 analysis”, dated 04/10/97, compliance is indicated for No. 1 fuel oil, No. 2 fuel oil (diesel), natural gas, butane, propane, and wood fuel. The tilting refinery furnace (ID No. TRF-1) will be fired with natural gas. The emergency generator (ID No. ES-1) will be fired with diesel fuel.

Therefore, the facility is expected to be in compliance with 02D .0516 when firing fuel at this facility.

c. 15A NCAC 02D .0521, “Control of Visible Emissions”

In order to comply with 02D .0521, the visible emissions shall not be more than 20 percent opacity when averaged over a six-minute period except that six-minute periods averaging not more than 87 percent opacity may occur not more than once in any hour nor more than four times in any 24-hour period.

This is a greenfield facility. Visible emissions are not expected with fabric filter control. Compliance will be determined during the initial inspection.

Therefore, the facility is expected to be in compliance with 02D .0521.

d. 15A NCAC 02D .0524, “New Source Performance Standards” (40 CFR Part 60 Subpart IIII)

The new emergency generator (ID No. I-EG-1) is subject to NSPS Subpart IIII. It is an emergency compression ignition internal combustion engine (CI ICE) and was manufactured after 2006.

The generator (ID No. I-EG-1) has a displacement of less than 10 liters per cylinder and a power rating of 200 bhp, which is less than 3000 hp. According to 60.4205(b) and 60.4202(a)(2), the engine must meet the emission standards listed in 40 CFR 89.112 and 40 CFR 89.113 for all pollutants:

Pollutant	Emission Limit (g/kW-hr)
NMHC + NO _x	4.0
CO	3.5
PM	0.20

The certificate of conformity was not included in the application due to the facility not having finalized the specific unit to purchase. The certificate will be verified during the initial compliance inspection.

In accordance with 40 CFR 60.4207(b), the facility will be limited to using diesel fuel with a sulfur content of less than 15 ppm. Furthermore, the facility must operate the generators according to the manufacturer's instructions.

In accordance with 40 CFR 60.4209(a), the Permittee is required to install a non-resettable hour meter prior to startup of the emergency generator.

In accordance with 40 CFR 60.4211(c), the Permittee is required to purchase engines which are certified to the emission standards listed in Table 1.

In accordance with 40 CFR 60.4211(f), the Permittee will be allowed to operate the emergency generators for the purposes of maintenance checks and readiness testing for no more than 100 hours per year. Any operation of the emergency generators other than for emergency operation, maintenance, and readiness testing will be prohibited.

The new engine will be a certified engine and the documents will be available for viewing during the initial compliance inspection. The facility expects to purchase ultra-low sulfur fuel to be used in the generator. Compliance will be determined during the initial compliance inspection.

Therefore, the facility is expected to be in compliance with 2D .0524 (NSPS Subpart IIII).

e. 15A NCAC 02D .0535, "Excess Emissions Reporting and Malfunctions"

As required by 15A NCAC 02D .0535, the Permittee of a source of excess emissions that last for more than four hours and that results from a malfunction, a breakdown of process or control equipment or any other abnormal conditions, shall:

- a. Notify the Director or his designee of any such occurrence by 9:00 a.m. Eastern time of the Division's next business day of becoming aware of the occurrence and describe:
 - i. the name and location of the facility,
 - ii. the nature and cause of the malfunction or breakdown,
 - iii. the time when the malfunction or breakdown is first observed,
 - iv. the expected duration, and
 - v. an estimated rate of emissions.
- b. Notify the Director or his designee immediately when the corrective measures have been accomplished.

This reporting requirement does not allow the operation of the facility in excess of Environmental Management Commission Regulations.

Therefore, the facility is expected to be in compliance with 02D .0535.

f. 15A NCAC 2D .0540, "Particulates from Fugitive Non-Process Dust Emission Sources"

This rule states in part that the facility must not cause or allow fugitive dust emissions from activities such as: unloading and loading areas, process areas stockpiles, stock pile working, plant parking lots, and plant roads (including access roads and haul roads) to cause or contribute to substantive complaints. The facility is a greenfield facility. Compliance will be determined during the initial compliance inspection.

Therefore, the facility is expected to be in compliance with 2D .0540.

g. 15A NCAC 2D .1100, “Control of Toxic Air Pollutants”

After the permit application and modeling were completed, the EPA determined the facility is subject to NESHAP 40 CFR Part 63 Subpart FFFFFFFF which includes an emission limit for particulate matter of 0.002 grains per dry standard cubic foot (gr/dscf) from the fabric filter exhaust vent. In accordance with 15A NCAC 02Q .0702(a)(27), this facility is exempt from North Carolina State air toxics. However the DAQ is required to perform a health risk assessment. The facility completed a toxics review in their initial application submittal and performed modeling on HCL because emissions exceeded the TPER limit in 2Q .0711. The tilting refinery furnace (ID No. TRF-1) will emit HCl through the fabric filter stack as well as fugitively during the process. Based on the application, fugitive emissions will occur when the furnace is charged, as well as when the furnace deslagging port is opened. This amounts to approximately 5.2% of the total batch time of 24 hours. Hoods are planned to be installed to help capture fugitive emissions which will be added to the other process gases in front of the fabric filter. With proper air flow, the hoods are expected to capture 90% of the exhaust that may escape from the charging doors and tap hole. Therefore, 10% of the fugitive gases could be emitted for only 5.2% of the batch time.

Based on the emissions calculations submitted in the application, the HCl emissions through the fabric filter stack are estimated to be 1.30 pounds per hour. The fugitive emissions are estimated to be 0.90 pounds per hour. The total emission rate is estimated to be 2.20 pounds per hour. The TPER limit in 2Q .0711(a) for sources with obstructed or non-vertically oriented stacks is 0.18 pounds per hour. The estimated actual emission rate is greater than the TPER limit.

Based on the memo from AQAB dated June 10, 2020, the facility has modeled in compliance on a source-by-source basis for the refinery furnace (ID No. TRF-1). The model did include fugitive emissions from the process. The model indicated a maximum concentration of 82 microgram/m³ which is 12% of the AAL. Therefore, the DAQ believes that the toxic emissions from this facility will not cause an unsafe health risk. Because the facility is exempt from air toxics per 02Q .0702(a)(27), toxics will not be listed in the air permit.

h. 15A NCAC 02D .1111, “National Emission Standards for Hazardous Air Pollutants” (40 CFR Part 63 Subpart ZZZZ)

The proposed diesel-fired emergency generator (ID No. I-EG-1) is considered a new compression ignition reciprocating internal combustion engine (CI RICE). The only requirement for new CI RICE located at area sources is that they comply with the requirements of NSPS Subpart IIII.

See section 4.d. for details regarding NSPS Subpart IIII. The facility will provide an EPA certification the proposed engine during the initial compliance inspection. Compliance will be determined during the initial compliance inspection.

Therefore, the facility is expected to be in compliance with 20D .1111.

i. 15A NCAC 02D .1111, “National Emission Standards for Hazardous Air Pollutants” (40 CFR Part 63 Subpart FFFFFFFF)

The facility will operate a secondary copper smelting operation. The 40 CFR 63 Subpart FFFFFFFF (6F) is the NESHAP for secondary copper smelting for area sources. A facility is subject to this

rule if they operate a new secondary copper smelter that is an area source of HAP emissions. According to 40 CFR 63.11158, a secondary copper smelter is “a facility that processes copper scrap in a blast furnace and converter or that uses another pyrometallurgical purification process to produce anode copper from copper scrap, including low-grade copper scrap. A facility where recycled copper scrap or copper alloy scrap is melted to produce ingots or for direct use in a manufacturing process is not a secondary copper smelter.” Also, anode copper is copper that is cast into anodes and refined in an electrolytic process to produce high purity copper.

The facility submitted an official request to EPA on July 6, 2020 asking for a determination as to whether the facility would be subject to this rule. Marion Watson with EPA contacted Denise Hayes of the MRO on July 14, 2020 with questions concerning how we processed the confidential information for the application. Her response on July 14, 2020 stated that the facility did not request the application be held as confidential. The EPA Acting Director of the Air and Radiation Section, Gregg Worley, sent a response email letter to the facility signed August 14, 2020 stating the facility was subject to NESHAP Subpart FFFFFF based on their proposed operations and the regulatory definitions.

The facility must not discharge to the atmosphere any gases which contain particulate matter (PM) in excess of 0.002 grains per dry standard cubic foot (gr/dscf) from the exhaust vent of any capture system for a smelting furnace, melting furnace, or other vessel that contains molten material and any capture system for the transfer of molten material. The Permittee shall conduct a performance test to demonstrate initial compliance with the PM emissions limit within 180 days after startup and report the results in your notification of compliance status. The Permittee shall conduct subsequent performance tests to demonstrate compliance with the PM emissions limit at least once every 5 years. Additional requirements are located in Section 7 of Permit 10674R00. The EPA determination letter is located in Attachment 1.

Therefore, the facility is expected to be in compliance with 02Q .1111.

j. 15A NCAC 02D .1806, “Control and Prohibition of Odorous Emissions”

In order to comply with 2D .1806, the facility must provide suitable measures for the control of nuisance odors such that the facility does not contribute to objectionable odors beyond the facility boundary.

This facility is a greenfield facility. They will use natural gas as fuel and do not use any solvents that may produce odors. Compliance will be determined during the initial compliance inspection.

Therefore, the facility is expected to be in compliance with 02D .1806.

k. 15A NCAC 02Q .0207, “Annual Emissions Reporting”

Pursuant to 15A NCAC 2Q .0207, the Permittee shall report by June 30 of each year the actual emissions of each air pollutant listed in 15A NCAC 02Q .0207(a) from each emission source within the facility during the previous calendar year. The report shall be in or on such form as may be established by the Director. The accuracy of the report shall be certified by the responsible official of the facility.

Therefore, the facility is expected to be in compliance with 02Q .0207.

l. 15A NCAC 02Q. 0304: “Application”

Pursuant to 15A NCAC 2Q .0304, the Permittee, at least 90 days prior to the expiration date of this permit, shall request permit renewal by letter in accordance with 15A NCAC 02Q .0304(d) and (f). Pursuant to 15A NCAC 02Q .0203(i), no permit application fee is required for renewal of an existing air permit. The renewal request should be submitted to the Regional Supervisor, DAQ.

Therefore, the facility is expected to be in compliance with 02Q .0304.

m. 15A NCAC 0317 Avoidance Conditions for 15A NCAC 02D .0530, “Prevention of Significant Deterioration”

The facility has enforceable limits so that emissions of particulate matter (PM), particulate matter 10 (PM₁₀), particulate matter 2.5 (PM_{2.5}), and nitrogen oxide (NO_x) remain below the 100 tpy PSD major source thresholds for each pollutant per consecutive 12-month period. The facility is considered to be one of the major 28 major stationary source categories as a secondary metal production plant (40 CFR 51.166). For NO_x emissions, the facility will not combust more than 920 million standard cubic feet of natural gas from the tilting refinery furnace (ID No. ES-TRF-1) and limit the diesel-fired emergency generator (ID No. I-EG-1) to no more than 500 hours per year. For particulate emissions, the facility will meet all emission limits and fabric filter requirements per 40 CFR Part 63, Subpart FFFFFFFF, National Emission Standards for Hazardous Air Pollutants for Secondary Copper Smelting Area Sources listed in Section 7 of Permit 10674R00.

The conditions are included in the permit along with monitoring, recordkeeping and reporting requirements. PM, PM₁₀, PM_{2.5} potential emissions are estimated to be less than 20 tons per year for each pollutant. NO_x potential emissions are expected to be less than 73 tons per year. See attachment 2 for estimated emissions.

Therefore, the facility is expected to be in compliance with 02Q .0317 of 2D .0530.

n. 15A NCAC 02Q .0317 Avoidance Conditions for 15A NCAC .1111, “Maximum Achievable Control Technology”

This facility is an area source of HAPs, but is subject to a GACT because it is classified as a Secondary Copper Smelting facility. The US EPA did not write a MACT (greater than 10 tpy of a single HAP or 25 tpy of a combination of HAPs) for this category. The DAQ will include a 112(g) avoidance condition in the permit in the event that the DAQ has to write a case-by-case MACT for this facility. Enforceable limits will be placed in the permit for avoidance of becoming a Title III major facility. The facility will ensure the avoidance limits are met by the testing, monitoring, and recordkeeping requirements and the proper operation and maintenance of the proposed control devices.

Under the provisions of North Carolina General Statute 143-215.108, the Permittee shall establish emission factors for hydrogen chloride by conducting an initial and periodic performance tests on the tilting refinery furnace. The furnace is controlled with a dry sorbent injection system (ID. No. CD-DSI-1) via the fabric filter (ID No. CD-BH-1). In addition to stack performance testing, the Permittee shall not process more than 365 batches of product per year. Monitoring,

recordkeeping, and reporting are required according to the Avoidance Condition. See attachment 2 for estimated emissions.

o. 15A NCAC 02Q .0504, “Option for Obtaining Construction and Operating Permit

Permitting [15A NCAC 02Q .0504(d)]

1. Pursuant to 15A NCAC 2Q .0501(b)(2), for completion of the two-step Greenfield significant modification process initiated by Application No. 10674R00, the Permittee shall file an amended application following the procedures of Section 15A NCAC 02Q .0500 within one year from the date of beginning operation of any of these sources (ID Nos. TRF-1, SILO-1, I-ACW-1, I-CT, I-MAT-1, and I-EG-1).

Reporting [15A NCAC 02Q .0508(f)]

2. The Permittee shall notify the Regional Office in writing of the date of beginning operation of any of these sources (ID Nos. TRF-1, SILO-1, I-ACW-1, I-CT, I-MAT-1, and I-EG-1), postmarked no later than 30 days after such date.

Therefore, the facility is expected to be in compliance with 02Q .0504.

p. Exempt for 15A NCAC 02Q .0711, “Emission Rates Requiring a Permit” in accordance with 15A NCAC 2Q .0702(a)(27).

This greenfield permit increases toxic pollutant emissions of acetaldehyde, acrolein, ammonia, benzene, benzo (a) pyrene, formaldehyde, n-hexane, nickel, and toluene. The sources at the facility are subject to GACTs. Therefore, North Carolina State toxics are exempt in accordance with 15A NCAC 02Q .0702(a)(27). However, the facility did submit a toxics analysis and modeling review in the initial application for hydrogen chloride as noted above in Item 4.g.

Toxic pollutant emissions (except for nickel) are from the combustion of natural gas. The application and updates received July 31 and August 6, 2020 used the expected actual fuel usage (107.3 million Btu/hr heat input) and the natural gas spreadsheet to calculate toxic emission rates. This method gives much more conservative emission rates than heat input rates of the burners (57.17 million Btu/hr). Nickel emissions are from the raw materials processed in the furnace and casting wheel.

Pollutant	NG Combustion	ACW-1	Total	TPER Limit	Modeling Required?
acetaldehyde	0.0000016 lb/hr		0.0000016 lb/hr	6.8 lb/hr	No
acrolein	0.0000019 lb/hr		0.00000189 lb/hr	0.02 lb/hr	No
ammonia	0.34 lb/hr		0.34 lb/hr	0.68 lb/hr	No
benzene	0.40 lb/yr		0.36 lb/yr	8.1 lb/yr	No
benzo(a)pyrene	0.00023 lb/yr		0.00021 lb/yr	2.2 lb/yr	No
formaldehyde	0.0079 lb/hr		0.0095 lb/hr	0.04 lb/hr	No
n-hexane	4.55 lb/day		4.55 lb/day	23 lb/day	No
nickel		0.00185 lb/day	0.00185 lb/day	0.13 lb/day	No
toluene	0.0086 lb/day		0.0086 lb/day	98 lb/day	No
	0.00036 lb/hr		0.00036 lb/hr	14.4 lb/hr	No

*Emissions from the emergency generator are not included since it is subject to NESHAP and will not make a significant contribution to the facility-wide totals.

The expected actual emissions using a much more conservative calculation method are less than the TPER limits for each pollutant. It is expected that with using the heat input rates of the burners, the emissions will be much lower.

Since the toxic air pollutants listed in the table above in this section are below their individual TPER thresholds, the DAQ believes that the emissions of these pollutants from the facility will not present an unsafe health risk.

5. Facility-wide Applicability to the Following:

a. NSPS

The emergency generator (ID No. I-EG-1) is subject to NSPS Subpart IIII.

b. NESHAPS

The emergency generator (ID No. I-EG-1) is subject to NESHAP Subpart ZZZZ.

The facility is subject to NESHAP Subpart FFFFFFFF. See Attachment 1 for the EPA determination letter.

c. PSD increment tracking

This facility is a PSD minor source. Cleveland County has triggered increment tracking under PSD for particulate matter 10 (PM₁₀), particulate matter 2.5 (PM_{2.5}), sulfur dioxide (SO₂), and nitrogen oxide (NO_x). This modification will result in an increase in 4.90 pounds per hour of PM₁₀, 4.85 pounds per hour of PM_{2.5}, 0.14 pounds per hour of SO₂, and 22.26 pounds per hour of NO_x.

Expected Actual Emission Calculations - CONTROLLED								
Emission Source ID	TRF-1	ACW-1	CT-TRF1	CT-ACW1	MAT-1	SILO1	EG-1	Facility Total
Description	Tilting Refinery Furnace with After Burner	Anode Casting Wheel	TRF Cooling Tower (Non-Contact)	ACW Cooling Tower (Contact)	Material Handling	Trona / NAHCO ₃ Storage Silo	187.5 kVA Diesel Emergency ICE	
Control Device ID	BH-1, TR-1	N/A	N/A	N/A	N/A	Bin Vent	N/A	
	lb/hr							
PM	2.82	0.83	0.06	0.74	8.32E-02	0.75	0.44	5.72
PM10	2.82	0.83	2.42E-03	1.55E-02	3.94E-02	0.75	0.44	4.90
PM2.5	2.82	0.83	6.04E-05	0.00E+00	5.96E-03	0.75	0.44	4.85

SO2	0.06	--	--	--	--	--	0.08	0.14
NOx	16.06	--	--	--	--	--	6.20	22.26

d. Attainment status

This facility is located in an area that is either in attainment or unclassifiable for all regulated air pollutants.

e. 112(r)

The facility is not subject to Section 112(r) of the Clean Air Act requirements because it does not store any of the regulated substances in quantities above the thresholds in the Rule. Section 112(r) of the Clean Air Act Amendments requires EPA to publish regulations and guidance for chemical accident prevention at facilities that use certain hazardous substances. These regulations and guidance are contained in the Risk Management Plan (RMP) rule. EPA regulations for implementing Section 112(r) are promulgated at 40 CFR part 68 “Chemical Accident Prevention Provisions.” 40 CFR part 68 was adopted by reference in the North Carolina Administrative Code at 15A NCAC 2D .2100.

Stationary sources (facilities) that have more than a threshold quantity of a regulated substance in a single process must develop a risk management program that includes a hazard assessment, an accident prevention program and an emergency response program. A risk management plan (RMP) to EPA. The RMP Rule lists methane as a regulated substance in Table 3 to §68.130. Listed substances that are used as fuel are specifically excluded from all provisions of the RMP Rule (§68.126 Exclusions); however, the proposed TRF cycle uses natural gas injection in the reduction step. The natural gas is injected up through the molten metal bath. Depending on the temperature of the atmosphere above the bath, the natural gas may combust in the furnace. Any uncombusted natural gas will be combusted in the post combustion chamber. The reduction step takes approximately 1-2 hours. Natural gas is injected at a rate of 990 Nm³/hr. The total mass of nonfuel natural gas in the process is 3,230 lbs / batch (24-hours). Assuming the methane content of the natural gas used is 97% methane by weight, the total mass of methane used in the process is 3,133 lbs. The RMP threshold quantity for methane is 10,000 lbs; therefore, the RMP Rule is not applicable.

- f. CAM** – 40 CFR 64 requires that a compliance assurance monitoring plan be developed for all equipment located at a major facility, that have pre-controlled emissions above the major source threshold, and use a control device to meet an applicable standard. Per NESHAP FFFFFF, the facility is required to use a bagfilter with specific testing and monitoring for the equipment associated with this rule. CAM is not applicable for this application.

6. Facility-Wide Air Toxics:

Air toxics were evaluated and a modeling exercise was performed in the initial application. However, this facility is exempt from State air toxics in accordance with 15A NCAC 2Q .0702(a)(27) because they are subject to a GACT (40 CFR Part 63, Subpart FFFFFF “National Emission Standards for Hazardous Air Pollutants for Secondary Copper Smelting Area Sources”).

7. Facility Compliance Status:

This facility has not been inspected because this is the facility's first permit. Compliance will be determined during the first inspection.

8. Facility Emissions Review:

Based on the August 14, 2020 applicability determination email letter from the EPA Acting Director of the Air and Radiation Section, Gregg Worley the facility is subject to NESHAP Subpart FFFFFF based on their proposed operations and the regulatory definitions. Thus, the facility is classified as a Title V source per Part 70.

Facility Emissions Summary

See attachment 2 for estimated emission estimates. The emissions presented in the original application and subsequent updates received July 31 and August 5, 2020 appear to be a good representation of the emissions profile for this facility. The potential PM, PM10, PM2.5, hydrogen chloride and total HAP emissions are greater than the TV thresholds of 100/10/25 tons per year. The facility will use dry sorbent injection and fabric filter control to reduce potential emissions. Emissions from the furnace (ID No. ES-TRF-1) and the anode casting wheel (I-ACW-1) are estimated using emissions factors from the manufacturer. The emissions from combustion were estimated using the DAQ natural gas and diesel emergency generator spreadsheets. The facility used estimated fuel usage to calculate emissions, which is a more conservative approach.

Emissions from other sources used Webfire and AP-42 emission factors.

9. Stipulation Changes to Permit:

Conditions for 02D .0515 (particulates), 02D .0516 (sulfur dioxide), 02D .0521 (visible emissions), 02D .0524 (NSPS, Subpart IIII), 02D .0535 (malfunctions), 02D .0540 (fugitive emissions), NESHAP FFFFFF (particulate), 02D .1112, 02D .1806 (odors), 02Q .0207 (reporting), 02Q .0304 (applications), 02Q .0317 (PSD and MACT avoidance), , 02Q .0504 (Title V), and federal rules applicable to exempt sources (NSPS Subpart IIII and NESHAP Subpart ZZZZ).

10. Exempt Source Review:

-The application lists an anode casting wheel (ID No. I-ACW-1) with potential emissions less than 5 tons per year. The casting capacity is 55 tons per hour. The source will emit particulate emissions. Based in the Webfire emissions factor for PM10, the estimated potential before controls are 3.61 tons per year.

$$(55 \text{ tons/hr}) \times (0.015 \text{ lb/ton}) \times (8760 \text{ hr/yr}) \times (\text{ton}/2000 \text{ lb}) = 3.61 \text{ ton/yr}$$

-The application lists two cooling towers (ID Nos. I-CT-TRF1 and I-CT-ACW1) with potential emissions less than 5 tons per year. The application used a spreadsheet created by the National Pollutant Release Inventory of Canada to calculate emissions. This spreadsheet uses 12,000 ppm of total dissolved solids in the calculation, where the AP-42 factor is 20,600 ppm.

Source	12,000 ppm emissions	20,600 ppm emissions
CT-TRF1	0.26 ton/yr	0.45 ton/yr
CT-ACW1	1.91 ton/yr	3.27 ton/yr

For worst case estimates, it is assumed total PM = PM10. Even with the higher dissolved solvent factor, the cooling towers will still be considered exempt per 2Q .0102(h)(5) for potential emissions less than 5 tons per year.

-The application lists material handling operations (ID No. I-MAT-1) with potential emissions less than 5 tons per year.

-The emergency generator (ID No. I-EG-1) can be considered exempt per 2Q .0102(h)(5) for potential emissions less than 5 tons per year. See the spreadsheet included in the application.

11. Control Device Evaluation:

The furnace (ID No. TRF-1) will be controlled with a fabric filter for control of particulate matter and dry sorbent injection for the control of hydrogen chloride. The application indicated a control efficiency of 99.4 % for particulate and 99.24 % for hydrogen chloride. The application was sealed by a registered PE.

12. Emission Inventory Review:

An emissions inventory is required with this application.

13. Other Regulatory Considerations

- A synthetic minor fee of \$400 was received May 19th. This application is classified as a Title V facility by the Secondary Copper Smelting GACT, and therefore an additional Title V Greenfield fee of \$9,777 was requested and was received by the DAQ on August 24, 2020.
- The appropriate number of application copies was received by the DAQ.
- A Professional Engineer's Seal is required for this initial application and was provided (ref. Jennifer Garvon, P.E. Seal # 036881, 5-5-2020).
- A zoning consistency determination was mailed to the City of Shelby on May 5, 2020 and was approved by Walter Scharer, Planning Director, City of Shelby on May 12, 2020.
- Public notice is not required for this modification to the State Permit issued under 15A NCAC 02Q .0300, however the Director has required a 30 day public notice since it is a greenfield facility.
- IBEAM Emission Source Module (ESM) update was verified on October XX, 2020.
- The application was signed by Mr. Bernard Schilberg, Site Operations, on May 5, 2020.

14. Recommendations:

The permit application for AMES Copper Group - Shelby, Cleveland County, North Carolina. has been reviewed by DAQ to determine compliance with all procedures and requirements. The DAQ has determined that this facility will achieve compliance, as specified in the permit, with all

requirements that are applicable to the affected sources. The DAQ recommends the issuance of Air Permit No. 10674R00.

DRAFT

ATTACHMENT 1



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

Ms. Jennifer Garvon, PE
Project Manager
CEC, Inc.
3701 Arco Corporation Dr., Suite 400
Charlotte, North Carolina 28273

Dear Ms. Garvon:

This is in response to your letter dated July 6, 2020, requesting an applicability determination (AD) for Title 40, Code of Federal Regulation (CFR), Part 63, Subpart FFFFFFFF - National Emission Standards for Hazardous Air Pollutants (HAPs) for Secondary Copper Smelting Area Sources as it may apply to a proposed secondary copper recovery facility at AMES Copper Group (AMES) in Shelby, North Carolina. Based on the information provided by you, and information contained within the synthetic minor construction and operating permit application filed with the North Carolina Department of Environmental Quality (NCDEQ) on May 6, 2020, the proposed facility is subject to the provisions of Subpart FFFFFFFF. The details of our AD are explained in the remainder of this letter.

Overview of the Proposed AMES's Copper Recovery Facility

The AMES copper recovery facility may be represented by five main unit operations as described below:

i) Stripping, Magnetic Separation, Sorting and Feedstock Formulation

- Feedstocks to the facility will include tubing, valves, windings, wire, radiators, turnings, mill scrap, ammunition casings (brass and bronze) and high-copper concentration alloys. Feedstocks will not include tin or zinc-ingots, fire-refined copper anodes or cathodes, motors, printed circuit boards, telephone switching gear, blast furnace slag, ingot maker drosses and slag or remelter drosses and slag.
- Raw material pre-smelting screening will utilize magnetic separation to screen and remove magnetic material from the feedstock. Determination of feedstock formulation recipes will include manual sorting, selection and consolidation of feedstock to produce a feedstock copper concentration formulation of not less than ninety weight (wt) percent (%). Pyrometallurgical treatment, such as sweating or burning of insulation on the wire, or volatilization of oils or organic compounds, will not occur at the facility.

ii) Charging and Melting

Over a period of approximately twelve hours, feedstock is piecemealed into the furnace as practical to achieve, and maintain, melting of the feedstock material. Smelting of the feedstock formulation will occur within an indirect natural gas fired tilting refinery anode furnace. The anode furnace's capacity is approximately one-hundred and eighty tonnes and a batch cycle time requires

approximately twenty-four hours to complete. Acidic and basic fluxing agents (silica and lime) are added during the charging and melting cycle to effect first stage refining of copper and slag formation.

iii) Oxidation and Deslagging

Second stage refining of the copper is accomplished by injecting compressed air, nitrogen and additional lime and silica fluxes into the molten bath over a period of approximately four hours. The oxidation cycle is necessary to enable oxidation of the impurities, resulting in an immiscible less-dense slag that may be mechanically separated and removed from the molten bath. As a result of this necessary oxidation cycle to remove impurities, undesirable elemental copper oxidation reactions also occur in the molten bath.

iv) Reduction

In the reduction cycle, final copper refining is achieved by converting oxides of copper to elemental copper. This reduction is accomplished by injecting natural gas through refining nozzles and into the molten bath for a period of approximately two hours. During this reduction cycle, carbon within the natural gas reacts with the oxygen of the copper oxides and liberates carbon dioxide, effecting the recovery and purification of elemental carbon.

v) Anode Casting and Cooling

Molten refined copper is transferred by the transfer launder system into an intermediate ladle, which is maintained at a temperature above the melting point. From the intermediate ladle, the molten material is transferred to the anode casting wheel by a secondary transfer launder system. The anode casting wheel contains anode molds that are indexed for filling with molten copper. Once filled, the molten copper within the anode molds is cooled to achieve pseudo solidification of the anodes for removal of the molds from the indexing system. The anodes are removed from the molds and cooled further for local storage at the facility. The anode casting and cooling unit operations requires approximately six hours to empty the capacity of the anode furnace. The proposed process will produce copper anodes with a copper purity of 99.7 wt%, anode copper grade product. The copper anode product will be shipped off site for further refining.

CEC's Basis of Proposed Subpart FFFFFF Non-Applicability

As detailed in the information you provided to the U.S. Environmental Protection Agency (EPA), and information contained in the permit application to the NCDEQ, you reason that Subpart FFFFFF is not applicable to the proposed facility based on the following presumptions:

- i) The proposed facility does not meet the definition of a secondary copper smelter under §63.11158 since it does not produce "anode copper" as defined in §63.11158.
- ii) The proposed facility will not utilize a pyrometallurgical purification process for raw material pretreatment, such as sweating or burning of insulation on the wire, or volatilization of oils or organic compounds.

The EPA's Applicability Determination

Under provisions of §63.11153(a), a new secondary copper smelter that is an area source of HAPs emissions is subject to this subpart. §63.11153(b) specifies that the affected source is a secondary copper smelter if construction or reconstruction occurred on or after October 6, 2006. Under definitions in §63.11158, secondary copper smelter means "... a facility that processes copper scrap in a blast furnace and converter or that uses another pyrometallurgical purification process to produce anode copper from copper scrap." Smelting furnace means "... any furnace, reactor, or other type of vessel in which copper scrap and fluxes are melted to form a molten mass of material containing copper and slag." Anode copper means "... copper that is cast into anodes and refined in an electrolytic process to produce high purity copper." Under provisions of §63.11155, emissions of particulate matter from the capture and control system of any smelting furnace, melting furnace, or other vessel that contains molten material, are limited to 0.002 grains per dry standard cubic foot.

According to the preamble in the Federal Register notice for the proposal of Subpart FFFFFF, electrolytic refining to produce high-purity copper from anode copper may occur either onsite at a secondary copper smelter or at another location.¹

Based on the supporting information, that includes the information contained in the permit application for the proposed facility and filed with the NCDEQ, the EPA has concluded that the proposed facility will be an affected facility under Subpart FFFFFF. The bases of the EPA's determination are provided below:

- i) The feedstock to the proposed process is not high-quality unalloyed copper scrap with a copper purity of greater than 99 wt% copper, which is a characteristic of a remelter.¹
- ii) The anode furnace may be classified as a "smelting furnace" because it is a furnace in which copper scrap and fluxes are melted to form a molten mass of material containing copper and slag.
- iii) Pyrometallurgical purification will be performed at the proposed facility. The anode furnace's smelting and fire refining cycles are considered pyrometallurgical purification processes.
- iv) The proposed process will not produce a specification brass or bronze product, which are characteristic products of ingot makers.
- v) The proposed process will increase the copper concentration by approximately 10 wt%, which is moderately greater than what an ingot maker could achieve.
- vi) The proposed process will produce a copper anode product with a product copper concentration of approximately 99.7 wt%, which may be classified as anode copper when the anodes are electrolytically refined, either on-site, or off-site.

¹ National Emission Standards for Hazardous Air Pollutants for Area Sources: Polyvinyl Chloride and Copolymers Production, Primary Copper Smelting, Secondary Copper Smelting, and Primary Nonferrous Metals—Zinc, Cadmium, and Beryllium; Proposed Rule, 71 Fed. Reg. 59311 (October 6, 2006).

- vii) The proposed copper product produced at AMES meets the definition of anode copper because copper anodes produced at the site will be further refined after leaving the facility.

This AD was coordinated with the EPA Office of Enforcement and Compliance Assurance and Office of Air Quality Planning and Standards. If you have any questions about this AD, please contact Tracy Watson at (404) 562-8998, or by email at watson.marion@epa.gov.

Sincerely,

GREGG
WORLEY

Digitally signed by
GREGG WORLEY
Date: 2020.08.14
07:38:40 -0400

Gregg Worley
Acting Director
Air and Radiation Division

cc: Denise Hayes, NCDEQ
John Cox, EPA OECA
Grecia Castro, EPA OAQPS
Tonisha Dawson, EPA OAQPS

DK

ATTACHMENT 2

Emission Estimates

(Process calculations revised 8-5-2020)

DRAFT

Data Input and Reference Calculations

Operating Parameters			
	Furnace Throughput Rate	TRF Cooling Tower ¹	ACW Cooling Tower ¹
tonne/batch	180	--	--
ton/batch	198	--	--
tons/hr	8	--	--
lb/hr	16,535	--	--
gpm	--	400	2900
m3/min	--	2	11
m3/hr	--	91	659

¹Mfr Quote

PTE Operating Hours	8,760 hrs/yr
Actual Expected Operating Hours	320 days/yr
	7,680 hrs/yr

Methane in Process (RMP)	
Conditions to be verified upon start-up	
Assumed conditions in Reduction Phase (NG Injection):	
Reduction phase	1-2 hours
Natural gas flow	990 Nm ³ /hr
Maximum natural gas used in process	1,980 Nm ³
Assumed density	0.74 kg/Nm ³
	1.63 lb/Nm ³
Total mass natural gas	3,230 lbs
% Methane content of natural gas	97%
Total methane in process	3,133 lbs
RMP Threshold Quantity	10,000 lbs

Conversion Factors	
1 tonne =	1.10231 ton
1 batch =	24 hrs
1 ton =	2000 lbs
1 gallon =	0.00378541 m3
1 hr =	60 min
1 day =	24 hrs
1 tonne =	1,000 kg
1 kg =	2.20462 lbs
1 ppm =	1 mg/kg
1 month =	30 days
1 mg =	2.20E-06 lbs
1 m3 =	35.3147 ft3
1 lb =	7,000 grain
1 yr =	8,760 hrs

Burner Rated Capacity			Fume Treatment
No. Burners		Per Burner	
Main Burner	2	6 MW	Yes
Ignition	2	7.5 kW	Yes
Launder	12	0.02 MW	No
DOC / Post Combustion	2	1.5 MW	Yes

Data Input and Reference Calculations

Particulate Control Efficiency	
Design Engineer Spec Controlled PM	0.002 gr/dscf
PM to baghouse ¹ - Maximum Short Term	
Smelting and Oxidation ²	130 kg/hr
Reduction and Casting ²	65 kg/hr
DSI (Trona) System	340 kg/hr
Total PM Generated	535 kg/hr
Uncontrolled - Max Short Term	1179 lb/hr
Subtract Fugitive Emissions (For CE Calculation)	2.79 kg/hr
Total PM to Baghouse (CE Calculation)	532 kg/hr
	1173 lb/hr
PM to baghouse - Annual	
Total Loading to Baghouse ¹	6680 kg/batch
	278 kg/hr
	614 lb/hr
Potential	2688 tpy
Maximum gas flow rate to baghouse	70,000 Nm ³ /hr
Humidity (max)	39 % Vol
Gas flow rate to baghouse (dry)	42,700 dNm ³ /hr
	1,507,938 dscf/hr
PM loading	7.78E-04 lb/dscf
	5.45 gr/dscf
Baghouse Control Efficiency (dry basis, max)	99.96%
Baghouse Control Efficiency (minimum)	
Gas flow rate to baghouse	70,000 Nm ³ /hr
	2,472,029 scf/hr
PM loading	4.75E-04 lb/scf
	3.32 gr/scf
Baghouse Control Efficiency (min)	99.94%

TRF Capture Efficiency	
Hood Exhaust Capture	90%
Furnace Door or Tap Hole Opening	25 times/batch
Duration of Time Furnace is Accessed	3 minutes
Total Time Door / Tap Hole is Open	1.25 hours/batch
Batch Duration	24 hours/batch
% of Time per Batch Ports are Open	5.2%
Total Fugitives	0.52%
Total TRF Capture Efficiency	99.48%



Detailed Emission Summary

Detailed Emission Summary

Operating Hours (Potential) 8,760 hrs/yr
Operating Hours (Actual) 7,680 hrs/yr

Expected Actual Emission Calculations - CONTROLLED								
Emission Source ID	TRF-1	ACW-1	CT-TRF1	CT-ACW1	MAT-1	SIL01	EG-1	Facility Total
Description	Tilting Refinery Furnace with After Burner	Anode Casting Wheel	TRF Cooling Tower (Non- Contact)	ACW Cooling Tower (Contact)	Material Handling	Trona / NAHCO3 Storage Silo Bin Vent	187.5 kVA Diesel Emergency ICE	
Control Device ID	BH-1, TR-1	N/A	N/A	N/A	N/A		N/A	
	tons / year							
PM	7.02	3.17	0.26	3.23	3.20E-01	2.88	0.11	17.00
PM10	7.02	3.17	1.06E-02	6.78E-02	1.51E-01	2.88	0.11	13.41
PM2.5	7.02	3.17	2.65E-04	0.00E+00	2.29E-02	2.88	0.11	13.20
SO2	0.06	--	--	--	--	--	0.02	0.08
NOx	61.68	--	--	--	--	--	1.55	63.23
CO	19.17	--	--	--	--	--	0.33	19.50
VOC	0.52	--	--	--	--	--	0.13	0.65
HCl	8.46	--	--	--	--	--	--	8.46
Lead	4.93E-05	7.27E-04	--	--	--	--	3.15E-06	7.79E-04
CO _{2e}	11,427	--	--	--	--	--	57.26	11,484



Detailed Emission Summary

Potential to Emit (PTE) Emission Calculations - UNCONTROLLED								
Emission Source ID	TRF-1	ACW-1	CT-TRF1	CT-ACW1	MAT-1	SILO1	EG-1	Facility Total
Description Control Device ID	Tilting Refinery Furnace with After Burner BH-1, TR-1	Anode Casting Wheel N/A	TRF Cooling Tower (Non- Contact) N/A	ACW Cooling Tower (Contact) N/A	Material Handling N/A	Trona / NAHCO3 Storage Silo Bin Vent	187.5 kVA Diesel Emergency ICE N/A	
	tons / year							
PM	2687.65	3.62	0.26	3.23	3.65E-01	3.28	0.11	2,698.53
PM10	2687.65	3.62	1.06E-02	6.78E-02	1.72E-01	3.28	0.11	2,694.92
PM2.5	2687.65	3.62	2.65E-04	0.00E+00	2.61E-02	3.28	0.11	2,694.69
SO2 ¹	0.28	--	--	--	--	--	0.02	0.30
NOx	70.36	--	--	--	--	--	1.55	71.91
CO	21.86	--	--	--	--	--	0.33	22.19
VOC	2.54	--	--	--	--	--	0.13	2.66
HCl	1,271.33	--	--	--	--	--	--	1,271.33
CO _{2e}	55,013	--	--	--	--	--	57.26	55,071

Potential to Emit (PTE) Emission Calculations - CONTROLLED								
Emission Source ID	TRF-1	ACW-1	CT-TRF1	CT-ACW1	MAT-1	SILO1	EG-1	Facility Total
Description Control Device ID	Tilting Refinery Furnace with After Burner BH-1, TR-1	Anode Casting Wheel N/A	TRF Cooling Tower (Non- Contact) N/A	ACW Cooling Tower (Contact) N/A	Material Handling N/A	Trona / NAHCO3 Storage Silo Bin Vent	187.5 kVA Diesel Emergency ICE N/A	
	tons / year							
PM	8.01	3.62	0.26	3.23	3.65E-01	3.28	0.11	18.88
PM10	8.01	3.62	1.06E-02	6.78E-02	1.72E-01	3.28	0.11	15.27
PM2.5	8.01	3.62	2.65E-04	0.00E+00	2.61E-02	3.28	0.11	15.05
SO2 ¹	0.28	--	--	--	--	--	0.02	0.30
NOx	70.36	--	--	--	--	--	1.55	71.91
CO	21.86	--	--	--	--	--	0.33	22.19
VOC	2.54	--	--	--	--	--	0.13	2.66
HCl	9.65	--	--	--	--	--	--	9.65
CO _{2e}	55,013	--	--	--	--	--	57.26	55,071

Detailed Emission Summary

TOXIC AIR POLLUTANT - Expected Actual Emissions After Controls and Limitations									
Emission Source ID						Facility Total	TRF-1	ACW-1	EG-1
					TPER 15A NCAC 02Q .0711 (a)		Total Natural Gas Combustion	Anode Casting Wheel	187.5 kVA Diesel Emergency ICE
Description	CAS	Units	Exceeds TPER						
Control Device ID							(see note ¹)	N/A	N/A
Acetaldehyde (TH)	75070	lb/hr	No	6.8	1.08E-03	1.60E-06	--	1.07E-03	
Acrolein (TH)	107028	lb/hr	No	0.02	1.31E-04	1.89E-06	--	1.30E-04	
Ammonia (T)	7664417	lb/hr	No	0.68	0.34	3.37E-01	--	--	
Arsenic unlisted compounds (TH)	ASC-other	lb/yr	No	0.053	0.00	0.00	--	2.80E-03	
Benzene (TH)	71432	lb/yr	No	8.1	1.05	3.99E-01	--	6.53E-01	
Benzo(a)pyrene (TH)	50328	lb/yr	No	2.2	3.60E-04	2.28E-04	--	1.32E-04	
Beryllium metal (unreacted) (TH)	7440417	lb/yr	No	0.28	0.00	0.00	--	2.10E-03	
1,3-Butadiene (H,T)	106990	lb/yr	No	11	2.74E-02	--	--	2.74E-02	
Cadmium metal (elemental unreacted) (TH)	7440439	lb/yr	No	0.37	2.10E-03	0.00	--	2.10E-03	
Soluble chromate compounds, as chromium (VI) equivalent	SolCR6	lb/yr	No	0.0056	0.00	0.00	--	2.10E-03	
Formaldehyde (TH)	50000	lb/hr	No	0.04	9.54E-03	7.89E-03	--	1.65E-03	
Hexane, n- (TH)	110543	lb/day	No	23	4.55	4.55	--	--	
Manganese unlisted compounds (TH)	MNC-other	lb/day	No	0.63	2.02E-04	0.00	--	2.02E-04	
Mercury vapor (TH)	7439976	lb/day	No	0.013	1.01E-04	0.00	--	1.01E-04	
Nickel metal (TH)	7440020	lb/day	No	0.13	1.95E-03	0.00	1.85E-03	1.01E-04	
Toluene (TH)	108883	lb/day	No	98	2.23E-02	8.59E-03	--	1.37E-02	
		lb/hr	No	14.4	5.73E-04	0.00	--	5.73E-04	
Xylene (H,T)	1330207	lb/day	No	57	9.58E-03	--	--	9.58E-03	
		lb/hr	No	16.4	3.99E-04	--	--	3.99E-04	

¹While some of the combustion TAPs may be in particulate form and controlled by BH-1 and TR-1, the emission rates shown are uncontrolled.

¹While some of the combustion TAPs may be in particulate form and controlled by BH-1 and TR-1, the emission rates shown are uncontrolled.

Tilting Refinery Furnace (TRF-1)

Tilting Refinery Furnace (TRF)	
Batch Duration (hrs/batch)	24
Maximum TRF Operating Hours per Batch	16
Potential Operating Hours (Total)	8,760
Potential Batches	365
Expected Actual Operating Hours (Total)	7,680
Actual Expected Batches	320

Controlled PM (from Mfr)	0.002 gr/dscf
Capture Efficiency	99.5%
Baghouse Control Efficiency	99.9%
Overall Capture and Control Efficiency	99.4%

Conversion Factors	
1 ton =	2000 lbs
1 kw =	0.001 MW
1 m ³ =	35.3147 scf
1 scf =	1020 btu
1 MW =	3.41214245 MMBtu/hr
1 tonne =	1.10231 ton
1 kg =	2.20462 lbs

Manufacturers Emission Factors / Calculations				
Phase	CO kg/batch	NOx kg/batch	PM ¹ kg/batch	HCl kg/batch
Smelting	24	120	4.2	12.6
Oxidation	4.8	12	0.8	1.6
Reduction	20	30	0.75	0
Casting/Holding	4.8	12	0.6	0
Total	53.6	174	6.35	14.2

¹Includes TRF and DSI PM Loading

For HCl Calculations:	
Smelting	12 hrs
Oxidation	4 hrs
Total	16 hrs

Manufacturers Emission Factors / Calculations				
Phase	CO lb/hr	NOx lb/hr	PM ¹ lb/hr	HCl lb/hr
Smelting	2.20	11.02	0.39	1.74
Oxidation	0.44	1.10	0.07	0.22
Reduction	1.84	2.76	0.07	0.00
Casting/Holding	0.44	1.10	0.06	0.00
Total (lb/hr)	4.92	15.98	0.58	1.96
Expected Actual (tpy)	18.91	61.38	2.24	7.51
Potential (tpy)	21.57	70.01	2.55	8.57

Natural Gas Consumption Data			NG Consumption (Total)		NG Consumption (Total)		NG Consumption (Total)	
Natural Gas Burners	Number of Burners	Rating (each) ¹	Peak Nm ³ /hr	Daily Avg	Peak scf/hr	Daily Avg	Peak MMscf/year	Average
Main	2	6 MW	1,200	580	42,378	20,483	371	157
Ignition ²	2	7.5 kW	20	2	706	71	6	0.54
Reduction	2	(main burner)	1,100	90	38,846	3,178	340	24
Launder	12	0.02 MW	360	25	12,713	883	111	7
Post Combustion	2	1.5 MW	300	3	10,594	106	93	0.81
							922	190

¹This is an estimate from the mfr, the consumption is a more precise calculation (see below).

²Daily average conservatively estimated as 10% (2.4 hours of use).

Maximum Heat Input to a Single Burner (Main Burner) =	8.9 MW 30.4 MMBtu/hr Small Boiler (<100 mmBtu/hr)
Total NG Usage / Combustion Manufacturer Estimate Based on 310 days (24-hrs)	190 MMscf/yr
Total NG Usage / Combustion for Potential to Emit Calculations Based on 8,760 hrs/yr	921.9 MMscf/yr
Total Maximum NG Consumption (MMBtu/hr)	107.3 MMBtu/hr

Example combustion calculation for Main Burner:	
Burner rating estimate	6 MW
	20.47 MMBtu/hr
At 8,760 hrs/year	179342.21 MMBtu/yr
	176 MMscf/yr
Max NG combustion from mfr calculations = 371 MMscf/yr	

Tilting Refinery Furnace (TRF-1)

Trona Dry Sorbant Injection (DSI) System	
Feedstock throughput rate	188 tonnes/batch
Estimated organics in feedstock	2%
Organic throughput rate	3.76 tonnes/batch
	3760 kg/batch
	156.67 kg/hr
Worst-case chlorinated compounds in feedstock	50%
Organic throughput as HCl	78.33 kg/hr
	172.70 lbs/hr
TRF Capture Efficiency	99.48%
Fugitive Emission Rate	0.90 lbs/hr
HCl to Injection System	171.80 lbs/hr
Controlled HCl emission rate	14.2 kg/batch
	0.59 kg/hr
	1.30 lb/hr
DSI Control Efficiency (calculated)	99.24%
Total HCl Controlled Emission Rate (Fugitive + Controlled)	
	2.20 lb/hr
15A NCAC 02Q .0711(b) TPER for HCl	0.74 lb/hr

TRF Fugitive Emission Calculations for Particulate Matter	
PM Loading to Baghouse from TRF - Short Term Maximum ¹	
Smelting and Oxidation	130 kg/hr
Reduction and Casting	65 kg/hr
	195 kg/hr
	430 lb/hr
PM Loading To Baghouse - Annual ¹	
Smelting and Oxidation	2080 kg/batch
Reduction and Casting	520 kg/batch
DSI (Trona) System	4080 kg/batch
	6680 kg/batch
	14,727 lb/batch
Expected Actual	320 batches/yr
Potential	2356 tpy
	365 batches/yr
	2688 tpy
% PM Generated by TRF	39%
PM Loading To Baghouse Generated by TRF	
Short Term Maximum	429.90 lb/hr
Expected Actual	917.12 tpy
Potential	1,046.09 tpy
TRF Capture Efficiency	99.5%
Fugitive PM from TRF	
Short Term Maximum	2.24 lb/hr
Expected Actual	4.78 tpy
Potential	5.45 tpy

¹PM loading rates provided by Design Engineer.

Emission Calculations - TRF, including DSI						
Pollutants	Controlled		Uncontrolled		Controlled	
	Expected	Actual	Potential	Potential	Potential	Potential
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
PM (See note)	2.82	7.02	1,609.37	2,687.65	2.82	8.01
PM10 (See note)	2.82	7.02	1,609.37	2,687.65	2.82	8.01
PM2.5 (See note)	2.82	7.02	1,609.37	2,687.65	2.82	8.01
SO ₂ ¹	0.06	0.06	0.06	0.28	0.06	0.28
NO _x	16.06	61.68	16.06	70.36	16.06	70.36
CO	4.99	19.17	4.99	21.86	4.99	21.86
VOC ¹	0.58	0.52	0.58	2.54	0.58	2.54
HCl (HAP, TAP)	2.20	8.46	290.26	1271.33	2.20	9.65
GHG	tonnes/yr	ton/yr	--	tpy	--	tpy
CO _{2e} ¹	10,358	11,418	--	55,013	--	55,013

¹NCDEQ Natural Gas Combustion Emissions Calculator Rev N (01/05/2017).

Notes:

PM Controlled Emission Rates = [(Total Controlled PM from TRF + DSI, per design specs at baghouse exit) + Fugitive PM from TRF] + Transfer Launder

PM Uncontrolled Emission Rates = PM Loading to Baghouse + Transfer Launder

Transfer Launder Combustion Emissions ¹						
Pollutants	Controlled		Uncontrolled		Controlled	
	Expected	Actual	Potential	Potential	Potential	Potential
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
PM	4.17E-04	1.83E-03	4.17E-04	1.83E-03	4.17E-04	1.83E-03
PM10	1.61E-04	7.03E-04	1.61E-04	7.03E-04	1.61E-04	7.03E-04
PM2.5	2.57E-04	1.13E-03	2.57E-04	1.13E-03	2.57E-04	1.13E-03
NO _x	8.03E-02	3.52E-01	8.03E-02	3.52E-01	8.03E-02	3.52E-01
CO	6.74E-02	2.95E-01	6.74E-02	2.95E-01	6.74E-02	2.95E-01
¹ PM, NO _x , and CO emissions not accounted for in design engineer gas combustion calculations. Combustion emissions from the transfer launder are not routed to the fume treatment system. Based on 8,760 hrs/yr.						
Number of Burners	12 at		0.02 MW Each			
Total Burner Capacity	0.24 MW		0.82 MMBtu/hr			

Dispersion Modeling Parameters

	TRF Stack		
	Value	Units	Reference
Emission Rate	1	lb/hr	
Gas Exit Temp	220	C	Design engineer
	428	F	
	493.15	K	
Stack Exhaust Flow Rate	70,000	m ³ /hr	Design engineer
	2,472,029	ft ³ /hr	
	687	ft ³ /sec	
Stack Velocity	32	ft/sec	
Stack Diameter	1.60	meters	Design engineer
	5.25	ft	
	63	inches	
Stack Area	22	ft ²	
Stack Height	40	ft	Design engineer

Distance to Closest Property Line		
TRF Stack	197	ft
TRF Building	328	ft

	AAL		TRF Stack	TRF Fugitive
	mg/m ³	ug/m ³	Emission Rate	
Pollutant	1-hr		lb/hr	
HCl	0.7	700	1.30	0.90

	Modeled Results at 1 lb/hr		Modeled Results			Exceeds
	TRF Stack	TRF Fugitives	TRF Stack	TRF Fugitives	Total	AAL?
	1-hr		1-hr			No
Pollutant	ug/m ³		ug/m ³			
HCl	21.15	60.59	27.50	54.50	81.99	

Structure	Height		Max Horizontal Dimension	GEP Stack Height	L	SL
	ft	m	m	m	m	m
Proposed Building	50	15	70	73	15	76
Existing Building	30	9	182	44	9	46

TRF Fugitives - Building	
Value	Units
Emission Rate	1.00 lb/hr
Width	16 m
	52.49 ft
	32.81 ft
Height	10 m
Normalized Width	41.50 ft
Release Ht	50 ft
$\sigma_y = \text{width} / 4.3$	0.97 ft
$\sigma_z = \text{release height} / 2.15$	23.26 ft

^aCenter of volume height.

Conversion Factors	
1 ton =	2,000 lbs
1 lb =	453.592 grams
1 hr =	3600 sec
1 m ³ =	35.3147 ft ³
1 yr (actual) =	7,680 hrs/yr
1 ft =	12 inches
1 mg =	1,000 ug
1 m =	3.28084 ft
1 mm =	3.28E-03 ft

Anode Casting Wheel (ACW-1)

Anode Casting Wheel

Casting Capacity	50 tonnes/hr 50,000 kg/hr 55 tons/hr
Potential Operating Hours	8760 hr/yr
Actual Expected Operating Hours	7680 hr/yr

Emission Factor¹

PM10 1.50E-02 lb/ton cast

¹Web Fire SCC 30400239, uncontrolled PM10 filterable.

Conversion Factors

1 ton =	2000 lbs
1 ppm =	0.0001%
1 tonne =	1.10231 ton
1 tonne =	1,000 kg
1 mg =	2.20E-06 lbs
1 day =	24 hrs

Impurities - Product (Finished Anode) Target

Pb	Ni	Cd	Be	Cr
ppm				
229	93	--	--	--
% of anode				
0.023%	0.009%	0%	0%	0%

¹Includes Sn, Pb, Zn, Ni, Al, Si, Fe. From buyer specifications.

PM Emission Calculations

55 tons cast / hr 1.50E-02 lb PM10 / ton cast 8.27E-01 lb PM10 / hr			PTE		
			Actual	Pre Control	Post Control
Metal (As PM)	% Composition	Emission Rate	tpy	tpy	tpy
Nickel	0.009%	7.69E-05 lb/hr	0.0002952	0.000337	0.00033676
Pb	0.023%	1.89E-04 lb/hr	0.000727	0.000829	0.00082923

PM Emission Summary

	Expected Actual			Potential		15A NCAC 02Q .0711(b) TPER		
	lb/hr	lb/day	tpy	lb/hr	tpy	lb/hr	lb/day	lb/yr
Total PM (as PM10)	8.27E-01	--	3.17	8.27E-01	3.62	--	--	--
Nickel	7.69E-05	1.8E-03	0.00	7.69E-05	0.00	--	0.3	--
Pb	1.89E-04	--	0.00	1.89E-04	0.00	--	--	--

Cooling Tower Summary (CT-TRF1, CT-ACW1)

Cooling Tower Summary

TRF Cooling Tower (Non-Contact)			
Input Parameter	Value	Unit	Reference
Circulating Water	91	m ³ /hr	AP-42, Table 13.4-2
Drift	0.0025	%	
Total Dissolved Solids	20,600	ppmw	

		Expected Actual	Potential
	tonnes/yr	tons/yr	tons/yr
Total Particulate Matter (PM)	0.24	0.23	0.26

		Expected Actual		Potential	
	%	lb/hr	tons/yr	lb/hr	tons/yr
PM	100.00	0.060	0.23	0.060	0.26
PM10	4.0%	2.42E-03	9.28E-03	2.42E-03	1.06E-02
PM2.5	0.1%	6.04E-05	2.32E-04	6.04E-05	2.65E-04

ACW Cooling Tower (Contact)			
Input Parameter	Value	Unit	Reference
Circulating Water	659	m ³ /hr	AP-42, Table 13.4-2
Drift	0.0025	%	
Total Dissolved Solids	20,600	ppmw	
		Expected Actual	Potential
	tonnes/yr	tons/yr	tons/yr
Total Particulate Matter (PM)	2.93	2.83	3.23

		Expected Actual		Potential	
	%	lb/hr	tons/yr	lb/hr	tons/yr
PM10	2.1%	0.737	2.83	0.737	3.23
PM2.5	0.0%	1.55E-02	5.95E-02	1.55E-02	6.78E-02
		0.00E+00	0.00E+00	0.00E+00	0.00E+00

Conversion Factors	
1 mg =	2.20E-06 lbs
1 ton =	2,000 lbs
1 yr (potential) =	8,760 hrs
1 yr (actual) =	7,680 hrs
1 tonne =	1.10231 ton

The Government of Canada National Pollutant Release Inventory (NPRI) wet cooling tower spreadsheet calculator was used to calculate emissions of particulate matter from the cooling towers:
<https://www.canada.ca/en/environment-climate-change/services/national-pollutant-release-inventory/report/sector-specific-tools-calculate-emissions/wet-cooling-tower-particulate-guide.html>

Material Handling (MAT-1)

Material Handling

Throughput	8	tons/hr
Potential Operating Hours per Year	8,760	hrs/yr
Expected Actual Operating Hours per Year	7,680	hrs/yr
Material Handled	Copper Scrap	

Conversion Factors		
1	ton =	2000 lbs

Emission Factor Calculation

$E \text{ (lb/ton)} = k (0.0032) \times (U/5)^{1.3} / (M/2)^{1.4}$			
Moisture Content (M)	2.2	%	AP-42 5th Ed. Chap. 13.2.4-1 (Pellet Ore)
Mean Wind Speed (U)	5.9	mph	https://weatherspark.com/v/146899/Average-Weather-at-Charlotte-Douglas-International-Airport-North-Carolina-United-States-Year-Round#Sections-Wind
Particle Size Multiplier (k)			
PM	0.74		AP-42 5th Ed. Chap. 13.2.4, Equation 1
PM10	0.35		AP-42 5th Ed. Chap. 13.2.4, Equation 1
PM2.5	0.053		AP-42 5th Ed. Chap. 13.2.4, Equation 1

PM Emission Factor	3.36E-03	lb/ton
PM10 Emission Factor	1.59E-03	lb/ton
PM2.5 Emission Factor	2.40E-04	lb/ton

Emission Calculations					
Pollutant				Expected Actual	Potential
	Offload to Outdoor Scrap Storage	Load Scrap Charging Machine	Slag Handling	Total Material Handling	Total Material Handling
	lb/hr			tons/yr	
PM	2.77E-02	2.77E-02	2.77E-02	3.20E-01	3.65E-01
PM10	1.31E-02	1.31E-02	1.31E-02	1.51E-01	1.72E-01
PM2.5	1.99E-03	1.99E-03	1.99E-03	2.29E-02	2.61E-02



Dry Sorbant Injection (CD DSI-1)

DSI System

Facility Operation	
Expected Actual	7,680 hrs/yr
Potential	8,760 hrs/yr
Silo Operation	
Total Batch Process Time	24 hrs/batch
Silo Throughput - Hourly Basis	
Expected Actual / Potential	340 kg/hr 750 lb/hr
Silo Throughput - Annual Basis	
Expected Actual	2878 tpy
Potential	3283 tpy

Conversion Factors

1 kg =	2.20462 lbs
1 ton =	2,000 lbs

Trona Storage Silo

Emission Factor ¹	Control Device Efficiency ²
PM	
lb/ton	
5.2	99.9%

PM Emissions

Unit ID	Expected Actual -Controlled		Potential - Uncontrolled ²		Potential - Controlled	
	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
SILO1	0.75	2.88	0.75	3.28	0.75	3.28

¹Uncontrolled emission factor taken from Table 8.12-3, "Soda ash storage /loading and unloading" of USEPA's AP-42, *Compilation of Air Pollutant Emission Factors*

²The silo is equipped with a bin vent filter used for product recovery; therefore the bin vent is inherent process equipment and not considered a regulated control device.